The Impact of Digital Inclusion on Health Determinants, Dietary Quality, and Non-Communicable Disease Prevention for Healthy Aging: A Mixed-Methods Study

SHORT SYNOPSIS

Submitted in partial fulfilment of the requirement of the degree of

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To

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by

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Certificate

I hereby declare that the short synopsis "The Impact of Digital Inclusion on Health Determinants, Dietary Quality, and Non-Communicable Disease Prevention for Healthy Aging in Delhi: A Mixed-Methods Study." being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Nutrition and Dietetics under School of Allied Health Science of Manav Rachna International Institute of Research & Studies, Faridabad during the academic year 2024. It is a bona fide record of original work carried out under the supervision of Dr. Divya Sanghi and has not been submitted in full or part to any other university or institute for degree or diploma.

Further, it is certified that short synopsis is plagiarism free and proof has been submitted.

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ABSTRACT

Digital Inclusion refers to the efforts and strategies aimed at ensuring that all individuals and communities have access to and the ability to use digital technologies effectively. This includes not only access to the internet and digital devices but also the skills, knowledge, and support necessary to use digital tools and services meaningfully. Digital inclusion aims to eliminate disparities in access to digital resources, thereby enabling all population segments, particularly marginalized and vulnerable groups, to engage in activities that promote well-being, economic development, and social equity. After Covid-19 digital literacy has become essential capacity in modern society for all age-groups. For older adults, particularly those aged 60 years and above in India, digital literacy can play a pivotal role in shaping health-related behaviours, improving diet quality, and managing non-communicable disease (NCD) risks. As India faces a growing elderly population, understanding the impact of digital literacy on health outcomes is crucial for developing effective health interventions and policies. Higher levels of digital literacy among older adults are associated with improved health-related behaviours, such as increased physical activity, better adherence to medication, and proactive health screenings. Despite these benefits, several barriers hinder the widespread adoption of digital literacy among older adults in India. These include socioeconomic disparities, technological usability issues, and psychological barriers such as fear and lack of confidence. Addressing these challenges is essential for ensuring that older adults can fully benefit from digital technologies. Our study will be focusing on digital literacy levels, health-related behaviours, dietary patterns, and NCD risk management among older adults in Delhi NCR using mixed-methods approaches. A total of 400 older adults both male and female (60 years and above) will be recruited to collect data on socio-demographic profile, medical history, level of digital literacy, e-health literacy , healthy active aging, diet quality and NCD risk management using standardized questionnaires. The data will be collected both quantitatively and qualitatively. ‘Quantitative data’ will be analysed using both descriptive and inferential statistics, whereas ‘qualitative data’ will be examined through thematic and content analysis.

Keywords

Digital literacy, health-related behaviour, diet quality, non-communicable diseases, older adults,

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Introduction

In recent decades, India has experienced a significant demographic shift towards an aging population, with individuals aged 60 years and above comprising a substantial portion of the demographic landscape. This demographic transition brings forth various challenges related to health and well-being, particularly concerning 'non-communicable diseases (NCDs)' such as cardiovascular-diseases, diabetes, and hypertension. According to the India Aging Report 2023, older adults aged 60 and over in year 2022 constitute 10.5% of the total population. This figure is expected to reach 20.8% by 2050, and by the century's end, the elderly will make up more than 36% of the nation's population (UNFPA India, 2023). Concurrently, the rapid advancement and penetration of digital technologies have transformed communication, access to information, and healthcare delivery across the globe, including in India. This transformation has the potential to profoundly impact health-related behaviors, diet quality, and ultimately NCD risk scores among older adults.

"Digital literacy, defined as the ability to effectively and critically navigate, evaluate, and create information using digital technologies". It has become increasingly important for maintaining good health and daily tasks in modern-day society. This is particularly true for older adults, who are often at risk of being left behind in the digital revolution. In India's population of older adults aged 60 years and above is rapidly growing, digital literacy has the potential to significantly influence various aspects of health and well-being. Digital literacy among older adults encompasses a range of skills, including the ability to use smartphones, computers, and the internet to access information, communicate, and manage daily activities. These skills are crucial for enabling older adults to engage in health-promoting behaviors, access healthcare services, and maintain social connections. As digital technologies become more integrated into health care and daily life, the ability to use these technologies effectively is increasingly linked to better health outcomes (Choudhury & Singh, 2021). Another study suggests that accessing health information online helps older adults gain a better understanding of their health conditions, treatment-options, and preventive measures. This can lead to improved health management and proactive health behaviors (Singh & Sharma, 2020). For example, digitally literate older adults are more likely to engage in regular physical activity, seek preventive health screenings, and adhere to prescribed medical regimens (Desai et al., 2021). Digital literacy also plays a significant role in influencing diet

quality among older adults. Access to online nutritional information, healthy recipes, and dietary guidelines can help older adults make informed food choices that contribute to a balanced and nutritious diet. Additionally, the ability to shop for groceries online provides greater access to a variety of healthy food options, which is particularly beneficial for those with mobility issues (Banerjee et al., 2021). The impact of digital literacy extends to the management of non-communicable diseases (NCDs), which are prevalent among older adults. Digital tools such as health apps and wearable devices enable older adults to monitor vital health parameters, track medication schedules, and manage chronic conditions like diabetes, hypertension, and cardiovascular diseases more effectively (Jain et al., 2022). By facilitating better disease management and encouraging preventive health behaviors, digital literacy can contribute to lower NCD risk scores and improved overall health outcomes. Despite the potential benefits, several barriers hinder the adoption of digital literacy among older adults in India. These include socioeconomic factors such as low income and education levels, technological challenges related to the usability of digital devices, and psychological barriers like fear of technology and lack of confidence (Verma & Kumar, 2022). Addressing these barriers is essential to ensure that older adults can fully benefit from digital technologies. We are aiming to generate evidence on levels of digital literacy and its impact on health-related behaviors, diet quality, and NCD risk scores, facilitators and barriers of using digital technology among older adults in Delhi NCR regions.

Review of Literature

Digital literacy among older adults is an emerging area of interest, especially in the context of its impact on health-related behaviours, diet quality, and non-communicable disease (NCD) risk scores. According to the United Nations, the proportion of India's population aged 60 and above is projected to increase from 8% in 2015 to 19% by 2050. This demographic change underscores the need for targeted health interventions to address the unique health challenges faced by older adults, including the management of chronic diseases, diet quality, and overall health behaviours. This study will explores the current status of digital literacy among older adults aged 60 years and above in Delhi NCR, India and its implications for their health outcomes.

Digital Literacy among Older Adults in India

"Digital literacy involves the ability to use digital devices and the internet to access, evaluate, and communicate information". It includes basic skills such as operating a smartphone, navigating the internet, and using digital tools for communication. Research indicates a low level of digital literacy among older adults in India. A study by Choudhury and Singh (2021) found that less than 30% of older adults in urban areas had basic digital skills, with even lower percentages in rural areas. Lower income and educational levels are significant barriers to digital access and literacy (Verma & Kumar, 2022). Usability issues and the lack of senior-friendly interfaces limit older adults' ability to use digital devices effectively (Patel et al., 2021). Fear of technology and lack of confidence are common among older adults (Rajan et al., 2020).

Impact on Health-Related Behaviour

Digitally literate older adults are more likely to seek health information online. Singh and Sharma (2020) noted that older adults with internet access frequently used it to look up medical information, leading to better health management. Digital literacy facilitates the use of telemedicine services, which became crucial during the COVID-19 pandemic. A study by Desai et al. (2021) reported a significant increase in telemedicine consultations among digitally literate seniors, improving their access to healthcare. Participation in online health forums provides social support and health-related information. Research by Gupta et al.

(2021) showed that involvement in online communities improved mental health and provided practical health advice. A study by Neter and Brainin (2012) found that digital literacy significantly influences the likelihood of older adults engaging in health-promoting behaviours. Their research indicated that digitally literate individuals are more likely to seek health information online, leading to better health management and proactive health behaviours. Similarly, a study by Xie (2012) demonstrated that older adults who are proficient in using digital tools are more inclined to participate in preventive health measures, such as screenings and vaccinations. The accessibility of health information online enables these individuals to stay informed about their health status and the necessary steps to maintain it.

Impact on Diet Quality

Digital literacy enables older adults to access dietary guidelines and nutritional advice. According to Banerjee et al. (2021), older adults who used the internet had better knowledge of nutritional information and made healthier dietary choices. Digitally literate seniors can use online platforms to purchase groceries, which often include healthy food options. Sharma and Patel (2022) found that this convenience contributed to improved diet quality among older adults. Use of mobile apps for tracking diet and nutrition helps older adults maintain better diet quality. Kumar and Srivastava (2021) reported that seniors using dietary apps had better adherence to dietary recommendations and improved nutritional intake. The role of digital literacy in enhancing diet quality among older adults has also been a focus of several studies. A systematic review by Kelly et al. (2016) highlighted that digital intervention, such as mobile apps and online platforms, can positively impact dietary habits. These tools offer personalized nutrition advice and track dietary intake, helping users adhere to healthier eating patterns. In a specific study by DeBar et al. (2019), older adults using a digital health platform reported significant improvements in their diet quality. The platform provided tailored dietary recommendations and educational content, which facilitated better dietary choices and improved nutritional intake among the participants.

Impact on NCD Risk Scores

Digital tools assist in monitoring health parameters and managing chronic diseases. According to Jain et al. (2022), older adults who used health apps reported better

management of conditions like diabetes and hypertension. Increased digital literacy is associated with higher engagement in preventive health behaviours. A study by Singh et al. (2020) found that digitally literate seniors were more likely to engage in regular exercise and health screenings, reducing their NCD risk scores. Online health education programs enhance knowledge about NCD risk factors. Research by Aggarwal and Gupta (2021) demonstrated that participation in these programs led to significant lifestyle changes among older adults, lowering their risk of NCDs. Non-communicable diseases (NCDs) such as diabetes, hypertension, and cardiovascular diseases are prevalent among older adults, posing substantial health risks. Research has shown that digital literacy can play a crucial role in managing and reducing NCD risk scores. A study by Mackert et al. (2016) found that higher levels of digital literacy were associated with better health outcomes and lower NCD risk scores among older adults. The study emphasized that digitally literate individuals were more likely to use online health resources for disease prevention and management. In another study by Patel et al. (2020) examined the relationship between digital literacy and NCD management among older adults. The findings revealed that those with higher digital literacy levels had better control over their NCD conditions, attributed to their ability to access and utilize digital health information effectively.

Despite the growing body of literature on digital literacy and its impact on health-related behaviors, diet quality, and NCD risk scores among older adults in India, several gaps remain that need to be addressed to fully understand and leverage the potential benefits of digital literacy for this population. Most existing studies focus on specific aspects of digital literacy or its impact on a particular health outcome. There is a need for comprehensive studies that simultaneously examine the broad spectrum of health-related behaviors, diet quality, and NCD risk scores in relation to digital literacy among older adults residing in northern region of India. Such studies would provide a holistic understanding of how digital literacy influences overall health and well-being in this demographic. There is a significant gap in understanding how regional and socioeconomic disparities affect digital literacy and its impact on health outcomes. However, there is also a paucity of gender-specific studies that explore the unique barriers faced by older women in gaining digital literacy and how these barriers affect their health behaviors and outcomes. Addressing these gaps is crucial for developing targeted interventions that can promote digital inclusion and health equity. Some studies have highlighted the usability challenges of digital devices for older adults; Understanding the specific usability issues and preferences of older adults can inform the

development of more senior-friendly digital interfaces, thereby enhancing digital literacy and its positive impact on health (Rajan et al., 2020). The psychological and social factors that influence digital literacy among older adults are not well understood. More research is needed to explore how factors such as fear of technology, motivation, social support, and perceived usefulness of digital tools affect the adoption and effective use of digital technologies. This would help in designing interventions that not only address technical skills but also psychological and social barriers to digital literacy (Gupta et al., 2021). Addressing these research gaps is essential for developing a comprehensive understanding of the role of digital literacy in enhancing health outcomes among older adults in India. Our study will be focusing on regional and gender-specific disparities, usability issues, and the psychological and social dimensions of digital literacy using mix-method study design. By filling these gaps, policymakers and practitioners can design more effective interventions to promote digital inclusion and improve the health and well-being of older adults.

Implications from the study

The evidence from this study would help in formulation of population specific digital health interventions such as developing user-friendly digital platforms and mobile applications including simplified interfaces, voice-guided navigation and culturally relevant content to ensure accessibility and usability. Tailored educational programs such as workshops, tutorials and community training sessions for older adults enhancing their abilitiy to access, interpret and use digital health information could be planned. Digital platforms could also facilitate timely consultations with healthcare providers, reducing the progression of NCDs. The study highlights the need to address barriers to digital access, such as affordability, connectivity, and technological awareness. Policy recommendations could include subsidizing devices, providing free or low-cost internet, and ensuring the availability of technical support for older adults. By leveraging these insights, stakeholders can design and implement interventions that not only enhance digital inclusion but also improve the health outcomes and overall well-being of older adults in urban India.Description of Broad area

Despite the transformative potential of digital inclusion among older adults, there is a noticeable gap in understanding how inclusion of digital technologies influences health-determinants, dietary patterns, and NCD risk scores specifically in the context of India's aging population. In order to reduce this gap, this study examines the mechanism and

relationship between digital inclusions and key health outcomes among Indian older adults 60 years of age and above.

Study Hypothesis:

H0: Older adults with higher levels of digital Inclusion has no association with healthier behaviour, better diet quality and lower risk scores for non-communicable diseases.

H1: Older adults with higher levels of digital Inclusion are positively associated with healthier behaviour, better diet quality and lower risk scores for non-communicable diseases.

Aim: Present study aim to find the level of digital inclusion and Its Impact on health determinants, diet quality, and Non-Communicable Disease Prevention among older people for Healthy Aging in Delhi.

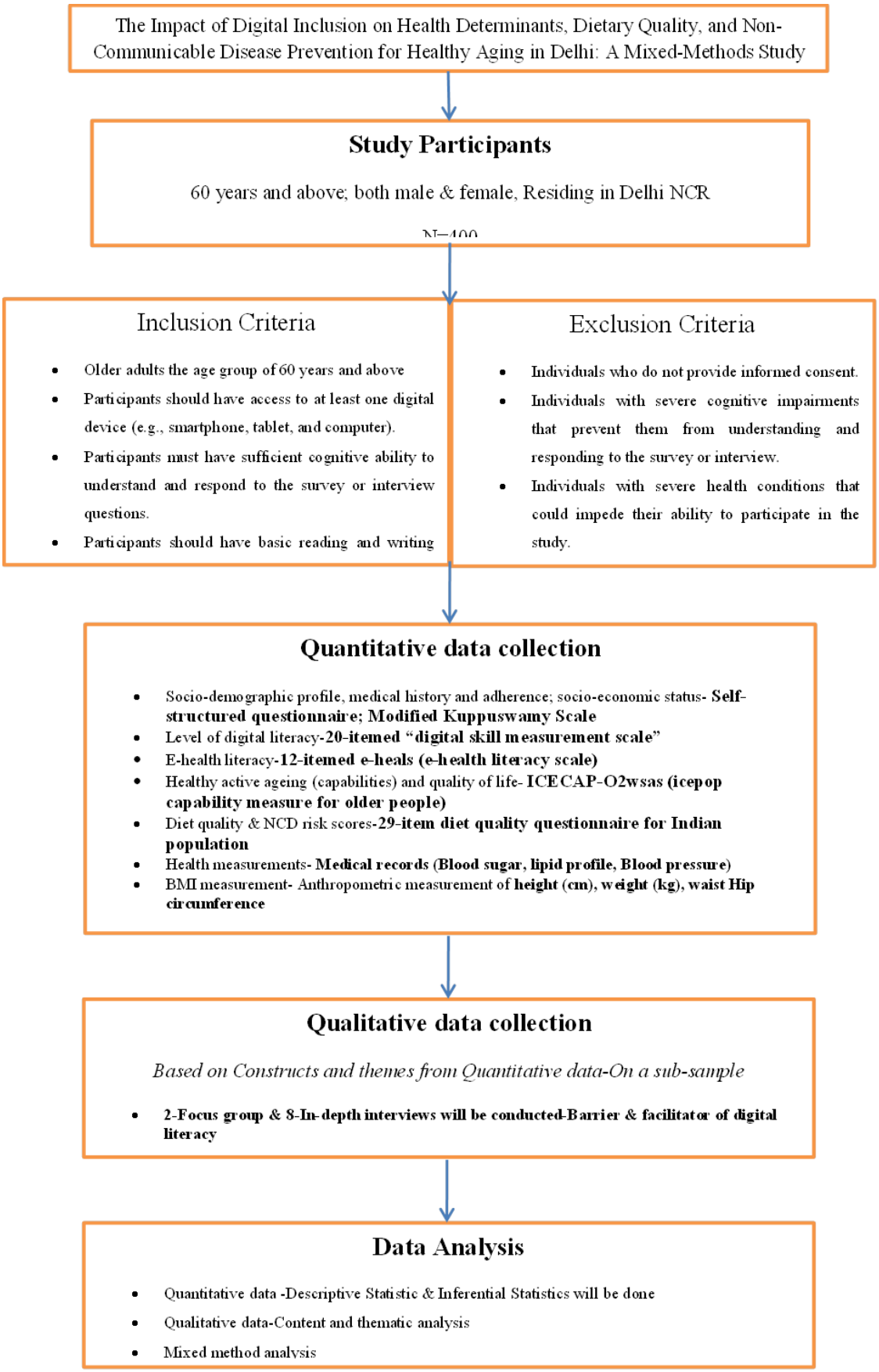
Objectives

The objectives of this study are to explore the contextual factors influencing digital inclusion and its impact on healthy aging in India.

Primary objectives:

1. To evaluate the extent of digital inclusion among older adults and its influence on key health determinants (e.g., e-healthy literacy, capability, quality of life and medication adherence).
2. To assess the relationship between digital inclusion and dietary quality in promoting healthy aging among older adults.
3. To investigate the impact of digital inclusion on the prevention and management of non-communicable diseases (NCDs) among older adults.
4. To explore the mediating role of digital inclusion in enhancing health-related practices that contribute to healthy aging in the Indian context.
5. To identify barriers and facilitators influencing digital inclusion among older adults.

Figure 1: Methodology at glance


The Impact of Digital Inclusion on Health Determinants, Dietary Quality, and Non-Communicable Disease Prevention for Healthy Aging in Delhi: A Mixed-Methods Study
Study Participants
60 years and above; both male & female, Residing in Delhi NCR
N=400
Inclusion Criteria
Older adults the age group of 60 years and above
Participants should have access to at least one digital device (e.g., smartphone, tablet, and computer).
Participants must have sufficient cognitive ability to understand and respond to the survey or interview questions.
Participants should have basic reading and writing
Exclusion Criteria
Individuals who do not provide informed consent.
Individuals with severe cognitive impairments that prevent them from understanding and responding to the survey or interview.
Individuals with severe health conditions that could impede their ability to participate in the study.
Quantitative data collection
Socio-demographic profile, medical history and adherence; socio-economic status- Self-structured questionnaire; Modified Kuppuswamy Scale
Level of digital literacy-20-itemed "digital skill measurement scale"
E-health literacy-12-itemed e-heals (e-health literacy scale)
Healthy active ageing (capabilities) and quality of life- ICECAP-O2wsas (icepop capability measure for older people)
Diet quality & NCD risk scores-29-item diet quality questionnaire for Indian population
Health measurements- Medical records (Blood sugar, lipid profile, Blood pressure)
BMI measurement- Anthropometric measurement of height (cm), weight (kg), waist Hip circumference
Qualitative data collection
Based on Constructs and themes from Quantitative data-On a sub-sample
2-Focus group & 8-In-depth interviews will be conducted-Barrier & facilitator of digital literacy
Data Analysis
Quantitative data -Descriptive Statistic & Inferential Statistics will be done
Qualitative data-Content and thematic analysis
Mixed method analysis

Methodology

1. **Locale of Study**: Present study will be conducted in Urban Societies of Delhi NCR

2. **Study Design**: 'Cross-Sectional Mixed-method study' (Quantitative & Qualitative) design will be used to assess the digital Inclusion and its impact on health-determinants, diet quality, and NCD risk scores among older adults 60 years and above residing in Delhi NCR.

3. **Study Sample**: Older adults both male and female 60 years and above

4. **Study sample inclusion criteria**:

- Older adults the age group of 60 years and above
- Both male and female individuals will be included
- Participants should have access to at least one digital device (e.g., smartphone, tablet, and computer).
- Participants must have sufficient cognitive ability to understand and respond to the survey or interview questions.
- Participants should have basic reading and writing skills.

Exclusion criteria:

- Individuals who will not provide informed consent.
- Individuals with severe cognitive impairments such as Alzheimer's Disease, Dementia, stroke with cognitive impairment etc that prevent them from understanding and responding to the survey or interview.
- Individuals with chronic health conditions such as stroke, Depression, Bipolar Disorder etc that could impede their ability to participate in the study.
- 5. **Sampling Technique:** Purposive convenience sampling
- **6. Sample Size: 400**

Sampling Techniques

Several considerations were used for calculating the sample size, include the desired level of confidence, margin of error, and estimated population parameters. The step-by-step outline to calculate the sample size for the study on digital literacy and its impact on health-related behaviors, diet quality, and NCD risk scores among older adults (60 years and above) in India is as follows:

Step 1: Determine Population Size

According to recent census data and demographic projections, older adults aged 60 years and above in India are approximately 120 million.

Step 2: Determine the Confidence Level

A confidence level of 95% is considered, which corresponds to a Z-score of 1.96.

Step 3: Determine the 'Margin of Error'

The margin of error (E) represents the permissible range of deviation between the sample statistics and the population parameter. In this study, a margin of error of 5% (0.05) is applied.

Step 4: Estimate the Proportion (p) or Expected Prevalence

Estimate the proportion of older adults who have basic digital literacy skills or use digital devices regularly. Due to lack of existing data from studies, we assume this proportion (p) is estimated to be 50% (0.50) for a conservative estimate.

Step 5: Calculate Sample Size

Use the following formula to calculate the minimum sample size required:

$n=\underline{Z^2*p*(1-p)/}\ E^2$

Where:

- "n= sample size required"
- "Z= Z-score corresponding to the desired confidence level (1.96 for 95% confidence level)"
- "p= estimated proportion (0.50)"
- "E= margin of error (0.05)"

Substitute the values into the formula:

$n= (1.96)^2 * 0.50 * (1.).50)/ (0.05)^2$

So, the calculated sample size n is approximately 384.16.

Step 6: Final Sample Size

After adjustments for non-response and design effect, the final recommended sample size for the study will be approximately 400 respondents. This ensures a robust representation of older adults in India across various regions and demographic characteristics.

Data Collection Methods

S.No	Study Variables	Study Tools
1	Socio-demographic profile, medical history and adherence; socio-economic status	Self-structured questionnaire; Modified Kuppuswamy Scale
2	Level of digital literacy	"20-itemed "digital skill measurement scale" of London school of economics, transcultural translated version"
3	E-health literacy	"12-itemed e-heals (e-health literacy scale)"
4	Healthy active ageing (capabilities) and quality of life	"'ICECAP-O' (icepop capability measure for older people)"
5	Diet quality & NCD risk scores	29-item diet quality questionnaire for Indian population
6	Health measurements	Medical records-blood sugar, lipid profile and blood pressure
7	BMI measurement	Anthropometric measurement of height (cm) & weight (kg)
8	Barrier & facilitator of digital literacy	Interviews & focus groups

Surveys and Questionnaires:

Quantitative Survey: Structured questionnaires will be used to assess socio-demographic profile, medical history and adherence, socio economic status the levels of digital literacy, e-health literacy, health behaviors such as healthy active ageing (capabilities), quality of life, diet quality, and NCD risk factors such blood pressure level, lipid profile, blood sugar using existing medical reports and anthropometric measurements such as Height (cm), Weight (kg) for body mass index and waist-hip circumference among older adults.

Digital Literacy Assessments:

The perceived digital skills of the study participants will be assessed using the transcultural translated version of the "Digital Skill Measurement Scale" developed by the London School of Economics (Alexander et al., 2014). This 23-item scale utilizes a 5-point Likert format to evaluate five key domains: operational skills, internet skills, information navigation, communication/social internet skills, creative skills, and mobile internet skills.

eHealth Literacy Scale:

Norman and Skinner conceptualized eHealth literacy as the capacity to search for, locate, comprehend, evaluate health information from electronic sources, and apply this knowledge to address or resolve health-related issues (Norman et al., 2006). The participants' self-reported ability to use information and communication technologies for health purposes will be evaluated using an 8-item, 5-point Likert eHealth Literacy Scale (Norman et al., 2006).

"ICECAP-O ("ICEpop CAPability measure for older people")":

This study focuses on community-dwelling older adults and their involvement in health promotion activities. While health is a key aspect in measuring quality of life, it is not the only factor (Verkerk et al., 2001). Capability refers to the ability to accomplish meaningful activities or make use of available resources. According to Sen's capability approach, quality of life measurement should not rely solely on perceived satisfaction but should also account for the conditions that enable individuals to engage in activities (Sen, A., 1993). Capability varies based on individual characteristics and the social environments they interact with. To assess the capability and well-being of study participants, we will utilize the "ICECAP-O" Instrument for older adults (Grewal et al., 2006). This 5-item tool evaluates the extent to which individuals can engage in valued activities, reflecting the broader concept of quality of life (ICECAP-O, 2022). The domains of the ICECAP-O, based on the capability concept, include (1) attachment, (2) security, (3) role, (4) enjoyment, and (5) control. These domains embody the core aspects of healthy and active aging, aligning with the study's objective of exploring how digital technology influences healthy aging among older adults. Additionally, personal, technical, and positional characteristics, as well as family, peer, and community factors, will be examined through a self-structured questionnaire.

Health and Dietary Assessments:

Dietary Surveys: Standardized tools such as Food Frequency Questionnaires (FFQs) and The Diet Quality Questionnaire (DQQ) will be utilized to collect data on dietary adequacy and health protection against non-communicable diseases (NCDs). These include indicators like NCD-Protect, NCD-Risk, and the Global Dietary Recommendations Score (GDR). The DQQ was designed for monitoring diet quality at the population level, rather than assessing individual dietary intake. It is intended to evaluate dietary patterns and trends within the general population. The questionnaire includes a total of 29 food groups.

Health Measurements: Standardized tools and medical records will be used to collect data on NCD risk factors such as blood pressure, blood glucose levels, lipid profile, waist hip circumference and BMI.

Interviews and Focus Groups:

Qualitative Interview: Semi-structured interview guide will be prepared to gain in-depth insights into the experiences, barriers, and perceptions of older adults regarding digital literacy and its impact on their health.

Focus Groups: Focus group discussions will be used to collect qualitative data from multiple participants simultaneously, facilitating the exploration of collective experiences and shared challenges related to digital literacy

Statistical Analysis:

Quantitative Data Analysis

Data Preparation

- Data will be cleaned to handle missing, outlier, and inconsistent values.
- Missing data will be addressed using multiple imputations if missing at random, or listwise deletion for complete-case analysis.

Descriptive Analysis

- Compute means, medians, standard deviations, and ranges for continuous variables (e.g., digital literacy scores, dietary quality index).
- Summarize frequencies and percentages for categorical variables (e.g., gender, access to devices).

Inferential Statistics

- **Association Testing**:
  - Use Chi-square tests to examine associations between digital literacy and categorical health indicators (e.g., regular exercise).
  - Use Pearson or Spearman correlation to assess relationships between digital literacy and continuous variables (e.g., dietary quality scores).
- **Group Comparisons**:
  - Independent t-tests or Mann-Whitney U tests for two groups (e.g., high vs. low digital literacy).
  - ANOVA or Kruskal-Wallis tests for comparisons across more than two groups (e.g., dietary quality by digital literacy quartiles).
- **Regression Analysis**:
  - Multiple linear regression for continuous outcomes (e.g., dietary quality index) with predictors such as digital literacy, socioeconomic status, and age.
  - Logistic regression for binary outcomes (e.g., presence/absence of NCD risk factors like hypertension).
  - Adjust for potential confounders like gender, education, and income level.

Mediation and Moderation Analysis

- Use structural equation modeling (SEM) or PROCESS macro to assess:
  - **Mediation**: If dietary quality mediates the relationship between digital literacy and health outcomes.
  - **Moderation**: If variables like age or socioeconomic status influence the strength of these relationships.

Hypothesis Testing

- Null Hypothesis (H_0): Digital literacy has no impact on health determinants, dietary quality, or NCD risk factors.
- Alternative Hypothesis (H_1): Digital literacy significantly impacts these outcomes.
- Significance Level: p-value < 0.05.

Software Tools

- Data analysis will be performed using SPSS or STATA.

Qualitative Data Analysis

Data Collection and Preparation

- Transcribe interviews and focus group discussions verbatim.
- Use NVivo or ATLAS.ti for data organization.

Thematic Analysis

- Employ an inductive coding framework to identify key themes.
- Use axial coding to relate themes to research objectives, particularly digital tool utility and barriers in health management.

Triangulation

- Compare qualitative findings with quantitative data for convergence and divergence.
- Use qualitative insights to contextualize statistical findings.

Mixed-Methods Integration

Quantitative + Qualitative Integration

- Use joint display tables to juxtapose numerical results with thematic narratives.
- Identify complementary and contradictory findings to provide holistic interpretations.

Expected Outcomes

This study will be aiming to contribute empirical evidence on the role of digital inclusion on following:

1. Shaping health-determinants,

2. Diet quality and NCD risk scores, prevention and management among older adults in India.

3. The findings are expected to inform policy makers, healthcare providers, and community organizations on strategies to enhance digital literacy among older adults, thereby promoting healthier aging and reducing the burden of NCDs.

Ethical Considerations

Informed Consent: Prior to participating in the study, all participants will receive an informed consent form, ensuring they are fully informed about the study's objectives, procedures, and potential risks. Confidentiality: We will implement measures to safeguard the confidentiality and privacy of participants' data. Anonymization techniques will be employed to ensure that individual responses cannot be linked back to the participants.

Approval from Ethics Committees: Studies involving human participants obtain approval from institutional ethics committees to ensure that the research adheres to ethical standards and guidelines. We will take ethical approval from Manav Rachna International Institute of Research & Studies.

Significance of the Study

The study's significance lies in its potential to inform targeted interventions and policies aimed at improving digital literacy among older adults in India, ultimately enhancing their health outcomes and quality of life. By addressing these issues, the research seeks to contribute to the broader discourse on aging, health, and technology in the context of a rapidly evolving digital landscape.

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OFFICE OF ED & DEAN RESEARCH
Research Ethics Committee
MRIIRS, FARIDABAD
Phone-0129-4198200
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25th November, 2024

Dr. Divya Sanghi
Supervisor
Professor & Head,
Department of Nutrition and Dietetics
SAHS,MRIIRS
Faridabad- 121001

Dear Dr. Divya Sanghi

The MRIIRS Ethics Committee has reviewed your request, for the ethical approval for the research project outlined below.

"The Impact of Digital Inclusion on Health Determinants, Dietary Quality, and Non-Communicable Disease Prevention for Healthy Aging: A Mixed-Methods Study"

Ms. Vandana Garg
Research Schlor
Ph.D Programme, MRIIRS
Reg No: 21/Ph.D/007

The case was discussed in the meeting of Ethical Committee, MRIIRS held on 16/10/2024 vide Online Mode at 10.15 am, the link is given below:

https://meet.google.com/afw-bphq-hwz

On examining the research work undertaken vide video presentation mode given by the Research scholar, the ethical approval is granted. Research scholar will provide participant information sheet and obtain consent of participants before collecting data for her study. The data collection is completely non-invasive. Also participant information sheet and consent form both English and Hindi has been submitted. The supervisor will monitor the whole study.

The required documents as asked in the meeting have been submitted today i.e. 25.11.2024 by Prof. (Dr.) Divya Sanghi, Supervisor, School of Allied Health Sciences, MRIIRS

Approval No:	EC/2023-24/054
Approval Date:	25/11/2024
Expiry Date:	30/11/2026
Ethics Committee Decision	Approved

The standard conditions of this approval are:

a) Conduct the project strictly in accordance with the proposal submitted and granted ethics approval. Including any amendments made to the proposal required by the MRIIRS Ethics Committee.
b) Report (email: dean.research@mriu.edu.in) immediately of any complaints or other issues in relation to the research project which may warrant review of the ethical approval of the project.
c) provide a 'progress report' for every year of approval.
d) provide a 'final report' when the project is complete.
e) advise in writing if the project has been discontinued

Please note that failure to comply with the conditions of approval and the **"INDIAN COUNCIL OF MEDICAL RESEARCH. 2017. NATIONAL ETHICAL GUIDELINES. FOR BIOMEDICAL AND HEALTH RESEARCH INVOLVING HUMAN"** may result in withdrawal of approval for the research project.

Sarita
25.11.24.

Dr Sarita Sachdeva
ED & Dean Research
MRIIRS

Dean-Researc
Manav Rachna Internationa
of Research & Studies
Sector 43, Aravali Hills, Surajkund Road
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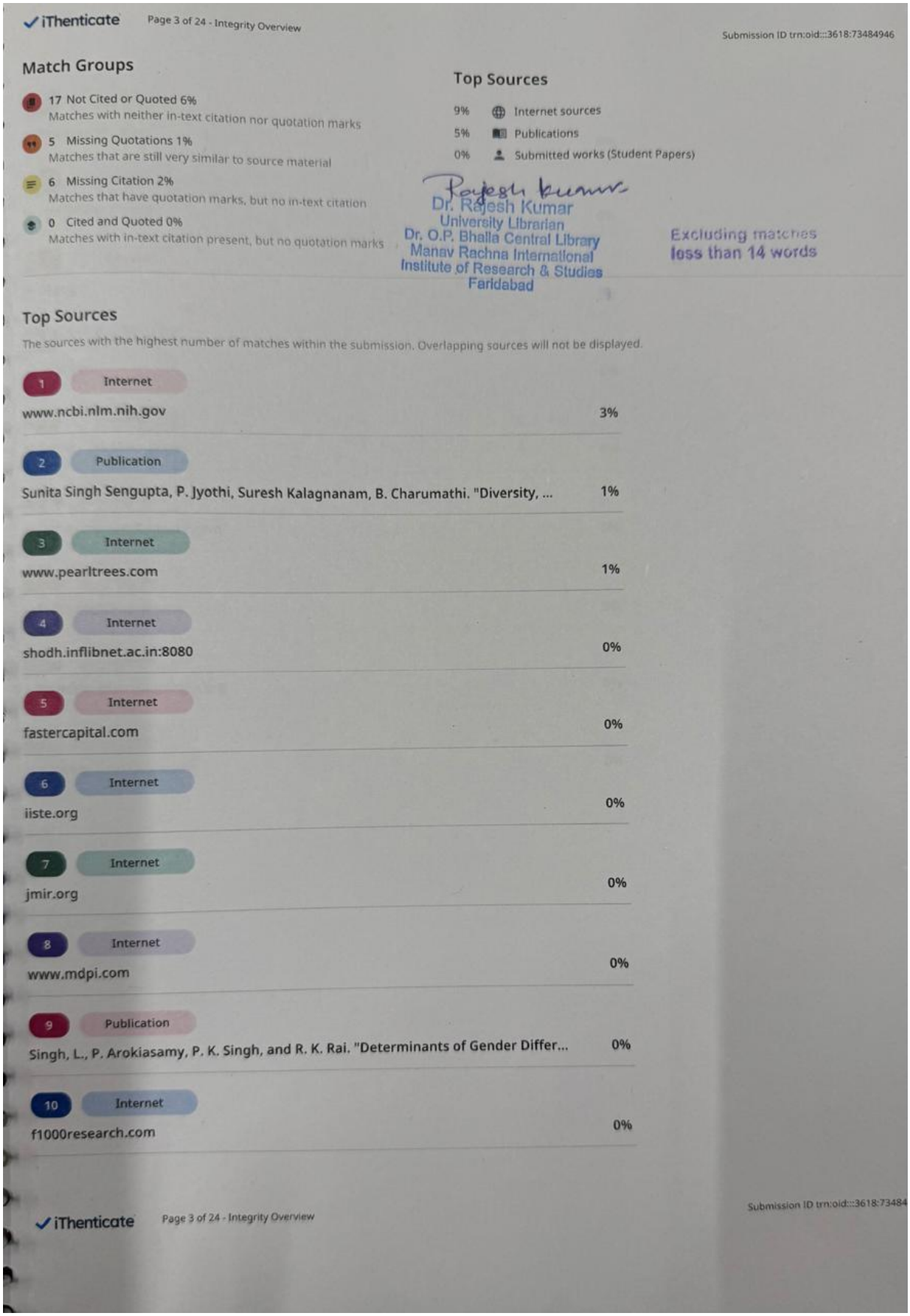

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Researcher: Ms. Vandana Garg
Registration Number: 12103MRIIRSPHN1N022

Supervisor: Dr. Divya Sanghi
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